

CLAIMS

That which is claimed is:

1. An article of footwear having an upper and a sole structure secured to the upper, the sole structure comprising:
 - a bladder formed of a barrier material, the bladder enclosing a fluid capable of exerting an outward force upon the barrier material; and
 - a reinforcing structure at least partially recessed into the barrier material and bonded to the barrier material, at least a portion of the reinforcing structure being placed in tension by the outward force upon the barrier material.
2. The article of footwear recited in claim 1, wherein the bladder includes a first surface, an opposite second surface, and a sidewall extending between the first surface and the second surface.
3. The article of footwear recited in claim 2, wherein a plurality of interior bonds join the first surface with the second surface, the interior bonds being spaced inward from the sidewall.
4. The article of footwear recited in claim 2, wherein the reinforcing structure has a first portion, a second portion, and a plurality of connecting portions extending between the first portion and the second portion.
5. The article of footwear recited in claim 4, wherein the first portion is secured to the bladder at an interface between the first surface and the sidewall, and the second portion is secured to the bladder at an interface between the second surface and the sidewall.
6. The article of footwear recited in claim 4, wherein the connecting portions are at least partially recessed into the sidewall and bonded to the sidewall.
7. The article of footwear recited in claim 6, wherein the fluid is pressurized so as to exert the outward force and the connecting portions are placed in tension by the outward force upon the barrier material.

8. The article of footwear recited in claim 6, wherein the fluid is pressurized so as to exert the outward force and the connecting portions restrain distension of the sidewall due to the outward force upon the barrier material.
9. The article of footwear recited in claim 5, wherein the first portion extends along a lateral side of the bladder, around a heel region of the bladder, and along a medial side of the bladder.
10. The article of footwear recited in claim 9, wherein at least one bridge member extends laterally across the bladder and connects opposite sides of at least one of the first portion and the second portion.
11. The article of footwear recited in claim 4, wherein at least one of the connecting portions is inclined.
12. The article of footwear recited in claim 4, wherein a space between two adjacent connecting portions is positioned in a rear-lateral region of the sole structure.
13. The article of footwear recited in claim 1, wherein a material forming the reinforcing structure has a greater modulus of elasticity than a material forming the bladder.
14. The article of footwear recited in claim 1, wherein the bladder and reinforcing structure are secured directly to the upper.
15. The article of footwear recited in claim 1, wherein a polymer foam material extends between the upper and both the bladder and the reinforcing structure.
16. The article of footwear recited in claim 1, wherein extensions of the reinforcing structure extend outward from the bladder and are secured to the upper.

17. The article of footwear recited in claim 1, wherein the bladder includes a first chamber and a separate second chamber with different pressures.
18. The article of footwear recited in claim 1, wherein an upper surface of the sole structure forms a ridge that defines a lasting surface, and the upper is secured to the sole structure in an area defined by the lasting surface.
19. The article of footwear recited in claim 18, wherein the reinforcing structure forms the ridge.
20. The article of footwear recited in claim 18, wherein the upper is secured to both the bladder and the reinforcing structure.
21. The article of footwear recited in claim 1, wherein a heel counter extends upward from the reinforcing structure.
22. The article of footwear recited in claim 1, wherein a plurality of extensions extend upward from the reinforcing structure.
23. The article of footwear recited in claim 22, wherein at least one of the extensions extend over an instep area of the footwear and form lace loops for receiving a lace.
24. The article of footwear recited in claim 1, wherein the reinforcing structure is formed of at least two different materials.
25. The article of footwear recited in claim 1, wherein the bladder and the reinforcing structure form a beveled area in a rear lateral area of the sole structure.
26. An article of footwear having an upper and a sole structure secured to the upper, the sole structure comprising:

a bladder extending from a lateral side to a medial side of the sole structure and through a substantial portion of a longitudinal length of the sole structure, the bladder being formed of a barrier material and having a first surface, an opposite second surface, and a sidewall extending between the first surface and the second surface, and the bladder enclosing a fluid that exerts an outward force upon the barrier material; and

a reinforcing structure having a first portion, a second portion, and a plurality of connecting portions, the first portion being secured to the bladder at an interface between the first surface and the sidewall, the second portion being secured to the bladder at an interface between the second surface and the sidewall, and the connecting portions extending between the first portion and the second portion, the connecting portions being at least partially recessed into the sidewall and bonded to the sidewall, at least one of the connecting portions being placed in tension by the outward force upon the barrier material.

27. The article of footwear recited in claim 26, wherein a material forming the reinforcing structure has a greater modulus of elasticity than a material forming the bladder.

28. The article of footwear recited in claim 27, wherein the connecting portions restrain distension of the sidewall due to the outward force upon the barrier material.

29. The article of footwear recited in claim 26, wherein at least one of the connecting portions is inclined.

30. The article of footwear recited in claim 26, wherein a space between two adjacent connecting portions is positioned in a rear-lateral region of the sole structure.

31. The article of footwear recited in claim 26, wherein the first portion has a generally u-shaped configuration that extends along a lateral side of the bladder, around a heel region of the bladder, and along a medial side of the bladder.

32. The article of footwear recited in claim 31, wherein at least one bridge member extends laterally across the bladder and connects opposite sides of at least one of the first portion and the second portion.
33. The article of footwear recited in claim 31, wherein extensions of the reinforcing structure extend outward from the bladder and are secured to the upper.
34. The article of footwear recited in claim 26, wherein a plurality of interior bonds join the first surface with the second surface, the interior bonds being spaced inward from the sidewall.
35. The article of footwear recited in claim 26, wherein at least one flexion indentation is formed in the second surface, and a space that includes the fluid extends between the indentation and the first surface.
36. The article of footwear recited in claim 35, wherein at least one interior bond joins the first surface with the indentation, the at least one interior bond being spaced inward from the sidewall.
37. The article of footwear recited in claim 26, wherein the bladder and reinforcing structure are secured directly to the upper.
38. The article of footwear recited in claim 26, wherein a polymer foam material extends between the upper and both the bladder and the reinforcing structure.
39. The article of footwear recited in claim 26, wherein the first surface has a concave configuration in at least a heel region of the footwear.
40. The article of footwear recited in claim 26, wherein an outsole is secured to the second surface.

41. The article of footwear recited in claim 26, wherein the first portion of the reinforcing structure forms a ridge that defines a lasting surface for securing the upper to the sole structure.
42. The article of footwear recited in claim 41, wherein the upper is secured to both the bladder and the reinforcing structure.
43. The article of footwear recited in claim 26, wherein a heel counter extends upward from the reinforcing structure.
44. The article of footwear recited in claim 26, wherein a plurality of extensions extend upward from the reinforcing structure.
45. The article of footwear recited in claim 44, wherein at least one of the extensions extend over an instep area of the footwear and form lace loops for receiving a lace.
46. The article of footwear recited in claim 26, wherein the reinforcing structure is formed of at least two different materials.
47. The article of footwear recited in claim 26, wherein the barrier material is a first sheet and a second sheet of a thermoplastic material.
48. The article of footwear recited in claim 47, wherein the first sheet and the second sheet are joined together to form a peripheral bond that is positioned adjacent the second surface.
49. The article of footwear recited in claim 47, wherein the first sheet forms the first surface and the sidewall, and the second sheet forms the second surface, the first sheet and the second sheet being joined together around a periphery of the bladder to form a peripheral bond.
50. The article of footwear recited in claim 26, wherein the bladder and the reinforcing structure form a beveled area in a rear lateral area of the sole structure.

51. An article of footwear having an upper and a sole structure secured to the upper, the sole structure comprising:

a bladder that defines a first surface, an opposite second surface, and a sidewall, the bladder enclosing a fluid that exerts an outward force upon the first surface, the second surface, and the sidewall; and

a reinforcing structure extending around at least a portion of the bladder, the reinforcing structure being at least partially recessed into the sidewall and bonded to the sidewall, and the reinforcing structure restraining distension of the first surface and the sidewall due to the outward force,

wherein the first surface and the reinforcing structure define a lasting surface that for directly securing the sole structure to the upper.

52. The article of footwear recited in claim 51, wherein the reinforcing structure has a plurality of connecting portions extending between a first portion and a second portion of the reinforcing member, the connecting portions extending along the sidewall.

53. The article of footwear recited in claim 52, wherein the connecting portions are at least partially recessed into the sidewall and bonded to the sidewall.

54. The article of footwear recited in claim 53, wherein the connecting portions are placed in tension by the outward force upon the barrier material.

55. The article of footwear recited in claim 54, wherein at least one of the connecting portions is inclined.

56. The article of footwear recited in claim 52, wherein a space between two adjacent connecting portions is positioned in a rear-lateral region of the sole structure.

57. The article of footwear recited in claim 51, wherein a plurality of interior bonds join the first surface with the second surface, the interior bonds being spaced inward from the sidewall to restrain distension of the first surface and the second surface.

58. The article of footwear recited in claim 51, wherein a material forming the reinforcing structure is has a greater modulus of elasticity than a material forming the bladder.

59. The article of footwear recited in claim 51, wherein the bladder and reinforcing structure are secured directly to the upper.

60. The article of footwear recited in claim 51, wherein a polymer foam material extends between the upper and both the bladder and the reinforcing structure.

61. The article of footwear recited in claim 51, wherein at least one flexion indentation is formed in the second surface, and a space that includes the fluid extends between the indentation and the first surface.

62. The article of footwear recited in claim 61, wherein at least one interior bond joins the first surface with the indentation, the at least one interior bond being spaced inward from the sidewall.

63. The article of footwear recited in claim 61, wherein the reinforcing structure forms a ridge located on medial and lateral sides of the first surface, and the lasting surface extends between portions of the ridge.

64. The article of footwear recited in claim 63, wherein the ridge extends around a heel region of the sole structure.

65. An article of footwear having an upper and a sole structure secured to the upper, the sole structure comprising:

a bladder formed of a flexible barrier material that encloses a pressurized fluid; and

a reinforcing structure extending around at least a portion of the bladder and at least partially recessed into the barrier material, the reinforcing structure being formed of a semi-rigid material that is bonded to the bladder.

66. The article of footwear recited in claim 65, wherein the pressurized fluid exerts an outward force upon the barrier material.

67. The article of footwear recited in claim 66, wherein at least a portion of the reinforcing structure is placed in tension by the outward force upon the barrier material.

68. The article of footwear recited in claim 66, wherein the reinforcing structure restrains distension of the barrier material due to the outward force upon the barrier material.

69. The article of footwear recited in claim 66, wherein the bladder includes a first surface, an opposite second surface, and a sidewall extending between the first surface and the second surface.

70. The article of footwear recited in claim 69, wherein the reinforcing structure restrains distension of the sidewall due to the outward force upon the barrier material.

71. The article of footwear recited in claim 69, wherein a plurality of interior bonds join the first surface with the second surface, the interior bonds being spaced inward from the sidewall.

72. The article of footwear recited in claim 71, wherein the interior bonds restrain distension of the first surface and the second surface due to the outward force upon the barrier material.

73. The article of footwear recited in claim 69, wherein the reinforcing structure includes a first portion, an opposite second portion, and a plurality of connecting portions extending between the first portion and the second portion of the reinforcing member, the connecting portions extending along the sidewall.

74. The article of footwear recited in claim 73, wherein the connecting portions are at least partially recessed into the sidewall and bonded to the sidewall.

75. The article of footwear recited in claim 73, wherein at least one of the connecting portions is inclined.

76. The article of footwear recited in claim 73, wherein a space between two adjacent connecting portions is positioned in a rear-lateral region of the sole structure.

77. The article of footwear recited in claim 73, wherein at least one bridge member extends laterally across the bladder and connects opposite sides of the first portion.

78. The article of footwear recited in claim 65, wherein extensions of the reinforcing structure extend outward from the bladder and are secured to the upper.

79. The article of footwear recited in claim 65, wherein the bladder includes a first chamber and a separate second chamber with different pressures.

80. An article of footwear having an upper and a sole structure secured to the upper, the sole structure comprising:

a bladder extending from a lateral side to a medial side of the sole structure and through a substantial portion of a longitudinal length of the sole structure, the bladder being formed of a barrier material and having a first surface, an opposite second surface, and a sidewall extending between the first surface and the second surface, and the bladder enclosing a pressurized fluid that exerts an outward force upon the barrier material, the barrier material having a first modulus of elasticity; and

a reinforcing structure having a first portion, a second portion, and a plurality of connecting portions, the first portion being secured to the bladder at an interface between the first surface and the sidewall, the second portion being secured to the bladder at an interface between the second surface and the sidewall, and the connecting portions extending between the first portion and the second portion, the connecting portions being at least partially recessed into the sidewall and bonded to the sidewall, the reinforcing structure being formed of a second

material having a second modulus of elasticity, the first modulus of elasticity being less than the second modulus of elasticity.

81. The article of footwear recited in claim 80, wherein the bladder and reinforcing structure are secured directly to the upper.

82. The article of footwear recited in claim 80, wherein a polymer foam material extends between the upper and both the bladder and the reinforcing structure.

83. The article of footwear recited in claim 80, wherein an outsole is secured to the second surface.

84. The article of footwear recited in claim 80, wherein at least one of the connecting portions is placed in tension by the outward force upon the barrier material.

85. The article of footwear recited in claim 80, wherein the connecting portions restrain distension of the sidewall due to the outward force upon the barrier material.

86. The article of footwear recited in claim 80, wherein at least one of the connecting portions is inclined.

87. The article of footwear recited in claim 80, wherein a space between two adjacent connecting portions is positioned in a rear-lateral region of the sole structure.

88. The article of footwear recited in claim 80, wherein the first portion has a generally u-shaped configuration that extends along a lateral side of the bladder, around a heel region of the bladder, and along a medial side of the bladder.

89. The article of footwear recited in claim 88, wherein at least one bridge member extends laterally across the bladder and connects opposite sides of the first portion.

90. The article of footwear recited in claim 88, wherein extensions of the reinforcing structure extend outward from the bladder and are secured to the upper.

91. The article of footwear recited in claim 80, wherein a plurality of interior bonds join the first surface with the second surface, the interior bonds being spaced inward from the sidewall.

92. The article of footwear recited in claim 80, wherein at least one flexion indentation is formed in the second surface, and a space that includes the fluid extends between the indentation and the first surface.

93. The article of footwear recited in claim 80, wherein at least one flexion indentation is formed in the second surface.

94. The article of footwear recited in claim 93, wherein the indentation extends from a lateral side of the bladder to a medial side of the bladder.

95. The article of footwear recited in claim 93, wherein at least one interior bond joins the first surface with the indentation, the at least one interior bond being spaced inward from the sidewall.

96. An article of footwear comprising:
a sole structure incorporating a fluid-filled bladder and a non-foam element secured to the bladder, the sole structure having an upper surface and an opposite lower surface, the upper surface forming a ridge that defines a lasting surface; and
an upper secured directly to the lasting surface.

97. The article of footwear recited in claim 96, wherein at least a portion of the bladder is secured to the upper.

98. The article of footwear recited in claim 96, wherein the non-foam element is a reinforcing structure extends around at least a portion of the bladder, the reinforcing structure forming the ridge.

99. The article of footwear recited in claim 98, wherein the upper is secured to both the bladder and the reinforcing structure.

100. The article of footwear recited in claim 99, wherein an adhesive directly bonds the bladder and the reinforcing structure to the upper.

101. The article of footwear recited in claim 96, wherein the ridge extends along a medial side of the sole structure, along a lateral side of the sole structure, and around a heel region of the sole structure.

102. The article of footwear recited in claim 96, wherein the upper surface of the sole structure forms a depression, and the ridge extends around the depression.

103. An article of footwear having an upper and a sole structure secured to the upper, a portion of the sole structure consisting of:

- a bladder formed of a flexible barrier material that encloses a fluid;
- a reinforcing structure extending around at least a portion of the bladder, the reinforcing structure being formed of a semi-rigid material that is bonded to the bladder; and
- an outsole secured to the bladder.

104. The article of footwear recited in claim 103, wherein the reinforcing structure is at least partially recessed into the barrier material.

105. The article of footwear recited in claim 103, wherein the reinforcing structure forms a ridge that defines a lasting surface.

106. The article of footwear recited in claim 105, wherein the upper is secured directly to the lasting surface.

107. The article of footwear recited in claim 103, wherein at least one flexion indentation is formed in a lower surface of the bladder.

108. The article of footwear recited in claim 107, wherein the indentation extends from a lateral side of the bladder to a medial side of the bladder.

109. The article of footwear recited in claim 107, wherein at least one interior bond joins an upper surface of the bladder with the indentation to form a space between the upper surface and the indentation that includes the fluid.